Computer Aided Productivity

Computer Aided Design Services from **CAD CAM Incorporated**

A new frontier of design solves one of industry's oldest problems.

Since the invention of the wheel, man has spent countless time and energy on how to make wheels more productively. Oddly enough, while he has discovered faster and better ways to make wheels, until recently he has neglected faster and better ways to design them.

CAD CAM Incorporated provides computer aided design services, which breathe greater productivity into the tedious and repetitive process of design and engineering. For our many customers, including those who make wheels, who have tapped our design knowledge and experience, this **computer aided productivity** is now a very profitable reality.

Many companies, of all sizes and in many industries, are developing and actively using computer aided design programs. And they are reaping great rewards — in terms of cost savings, reduced design time, less lead time, increased accuracy and improved quality. We know because we serve many of these companies, which include Fortune 500 leaders in their respective industries.

What we can do for you may lie in a choice, or combination, of three service categories:

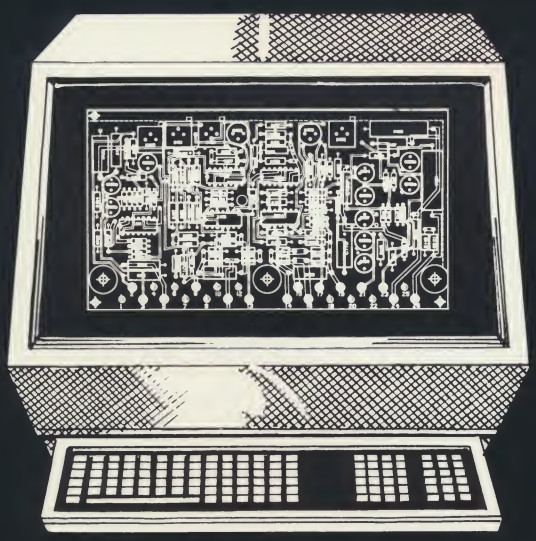
1. If you are developing an in-house computer aided design system, CAD CAM can provide operator training, software packages, and support design services on a contract basis.

2. If you don't have a system, let us provide computer aided drafting and design to support your key design staff.

3. A major service we provide is offering customers time on our computer system. In most cases, a customer's employee works at our facility, where he or she is provided an office/design station — and our back-up experience and support.

We would be pleased to serve you.

Printed circuit board design



The use of computer aided graphic systems for printed circuit board production is an especially appropriate and profitable application.

This process often starts with your logic diagram, but in other cases it begins with the schematic. Symbols, characters, and connecting points can be instantly retrieved from the computer's bank of data. As the design is completed on the cathode ray tube, your new data is stored for later use in producing schematic drawings, art work, detailing, dimensioning, and bills of material.

There are a number of automatic features offered as part of CAD CAM's computerized graphics systems that allow your engineers to eliminate many laborious, time-consuming tasks. These functions include automatic assignment and placement of components; routing of interconnects; confirming an accurate matchup between the schematic and the physical printed circuit board; detecting design rule violations; checking and editing network lists and design rules; generating bills of material, artwork, and drawing sets; and even providing numerically controlled drilling data.

CAD CAM is now developing other functions such as component insert data and computized update of FROM-TO logic data.

CAD CAM has recently established a special facility in Florida to service the rapidly growing demand for computer aided design of printed circuit boards; these specialists are also available in our Ohio and Texas operations.

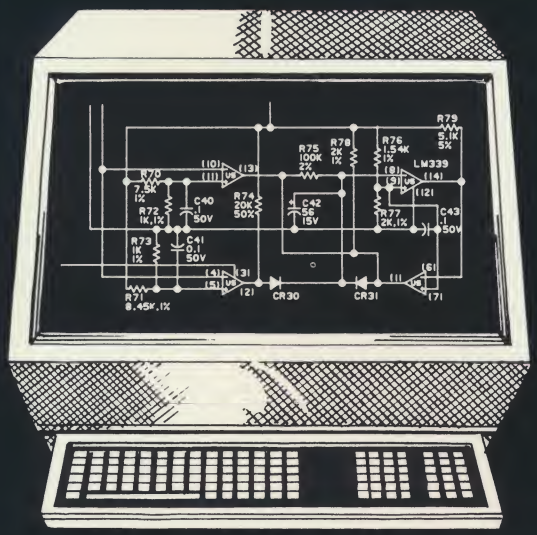
CAD CAM services will reduce your design time — and increase accuracy and quality.

Time spent by a designer in manually reworking and editing drawings is tedious, time-consuming, and costly.

- With CAD CAM computer aided design systems, a design engineer — yours or ours — can quickly generate and develop drawings on a display terminal and produce multiple hard copies in a matter of minutes.
- Upgrading or altering designs, which could take hours, can be done in a fraction of the time. A draftsman can promptly retrieve, from the computer, all design details related to a specific part and instantaneously revise and reprint those details.
- Computer-stored data decreases calculation time — and increases accuracy.
- Any repetitive elements of a design can be generated with the touch of a key, eliminating the need for time-consuming, repetitive, manual drawing.
- Different views of the same drawing can be generated and printed in minutes.
- Scales of drawings can be changed quickly, with computer precision and accuracy.

CAD CAM technology can assist you in cutting corners, cutting costs — and in increasing your design quality — at almost every step in the engineering process.

Wiring diagram design



Design and manufacturing of wiring systems for today's sophisticated electrical products requires a great deal of effort when done manually.

Your electrical engineer's original diagram may only be a starting point for many rounds of manual changes and additions before the process results in a finished electrical layout. Most of these changes involve erasing and redrafting on the original drawing or creating an entirely new, updated drawing.

CAD CAM Incorporated is ready to show your electrical engineers how to create wiring systems that can be designed, documented, and produced with far less effort and far more cost effectiveness.

In fact, we feature the CAD-AMATIC method of creating electrical systems on paper using your own specialized or hybrid electrical symbols which are printed on adhesive-backed acetate sheets and coded with a computer number.

Your engineer designs his electrical system simply by peeling off the appropriate printed symbols, positioning them on a sheet of paper, then adding the appropriate connecting lines between the various components.

This rough diagram is then given to the CAD CAM technician who quickly calls up the computer to display the basic symbol patterns which he connects with the appropriate lines. Clean, inexpensive, high-quality diagrams result from this unique process.

You gain a substantial investment... without having to make one.

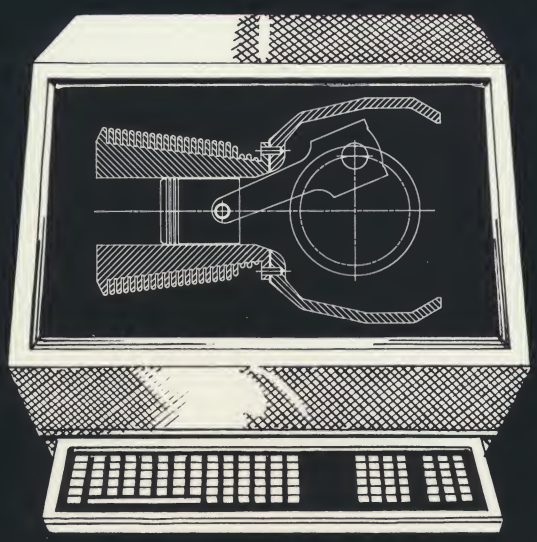
In developing a computer aided design system for your company, the most important investment you can make is in a proper data base. With the help of CAD CAM you can start investing now in your data base developed with the help of a professional staff. And you can avoid the heavy costs of purchasing your own equipment, training your personnel, and staffing to meet current and future demands which are not yet defined.

- You begin your data base development and computer aided design the right way. CAD CAM can guide you past the technical and administrative pitfalls directly to the benefits.
- You get results quickly, avoiding a costly and frustrating start-up period.
- You can capitalize on CAD CAM's many years of experience — and from our library of unique systems and standards developed in conjunction with many major corporations.
- Your engineering drawings created at CAD CAM can be permanently stored in our computer's memory. Your drawings can be promptly retrieved at any time changes are called for.
- You can gain an invaluable library of design standards as you invest in your data base.

General-purpose computer aided design service packages offered by CAD CAM will enable you to create, define, manipulate, edit, and store all types of two- and three-dimensional graphic information, including lines, shapes, circles, arcs, and splines. CAD CAM software specialists will assist you in adding virtually any form of specialized software package.

If and when CAD CAM services are replaced by an in-house computer aided design operation, the data base and design standards are retained by the customer.

Mechanical Design



Well executed engineering design programs can significantly improve productivity in all areas of your operation. By using design automation effectively at the beginning, many manual follow-up processes can be either eliminated or reduced in complexity.

Compiling the mechanical knowledge of your key technicians in a common data base is the key to CAD CAM's capacity to produce more cost-effective mechanical design programs for you.

Using the CAD CAM systems, mechanical parts or assemblies can be easily designed in either two-or three-dimension. They can be restored and/or checked for the proper fit by zooming in on the specific areas of the drawing. Mass properties of the part can be automatically analyzed to provide perimeter, volume, weight, area, center of gravity, and moment of inertia data. A finite element mesh can be generated along with the analysis of other structural data.

Various systems offered by CAD CAM can automatically generate dimension, witness lines, arrowheads, and alpha-numeric labels. Dimensions can be modified, added to, moved, or erased.

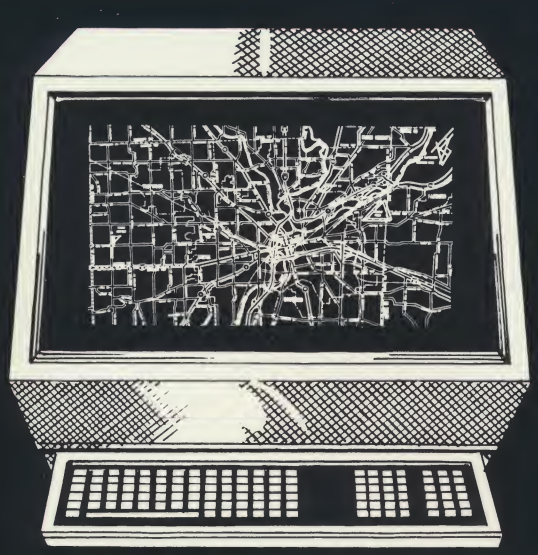
Mechanical design services offered by CAD CAM can be extended to the computer aided manufacturing process as well. Creation of numerical control tapes is the next logical step toward automating your design-manufacturing program. Data stored in our computer can be processed and post processed to provide a tape for practically any numerically controlled tool in your shop.

Free up key people, and get a grip on uneven workflow.

A computer aided design system is not intended to replace a designer or draftsman. Rather, it provides him with a powerful tool.

- Each designer, engineer or draftsman trained by CAD CAM to use our computer aided systems can immediately produce more work in less time. No longer will his or her time be required for the traditional redrawing, redimensioning or double checking of each job.
- Key people are freed from the drudgery of detailing to move onto their next important project.
- Your company's CAD CAM data base becomes an extension of key people — to store valuable knowledge now being stored in someone's head!
- The support gained from CAD CAM services and design staff can help you level out the "peaks and valleys" which can be associated with an engineering department's workflow. During periods when your workload is less, we can help your staff undertake measures that will reduce the need for a large increase in personnel when business accelerates again.

Mapping/Cartography



The ability of CAD CAM computer systems to store data in many forms enables us to perform mapping and cartography projects accurately and economically.

Once we convert your manually developed maps and topographic data into computer data, it's possible to employ that data to generate new maps with impressive speed, accuracy, and economy.

The key that unlocks these opportunities is the CAD CAM cartography system which establishes a totally integrated data base that can serve many agencies and political boundaries.

Once again, CAD CAM technicians offer you the experience they have gained in creating maps for many governmental bodies and businesses who have discovered that computer aided graphics assures greater accuracy — plus ready adaptability to their continually changing situations.

CAD CAM engineers not only offer you the computerized equipment necessary to store and process great volumes of graphic data, they also provide the peripheral devices such as digitizers and high-speed flatbed plotters that can complete even the largest mapping project within a minimum of time.

Productivity pluses of CAD CAM design support.

CAD CAM automated design systems outperform conventional drafting methods. In some extensive design projects for major companies, CAD CAM has achieved productivity ratios approaching 50:1!

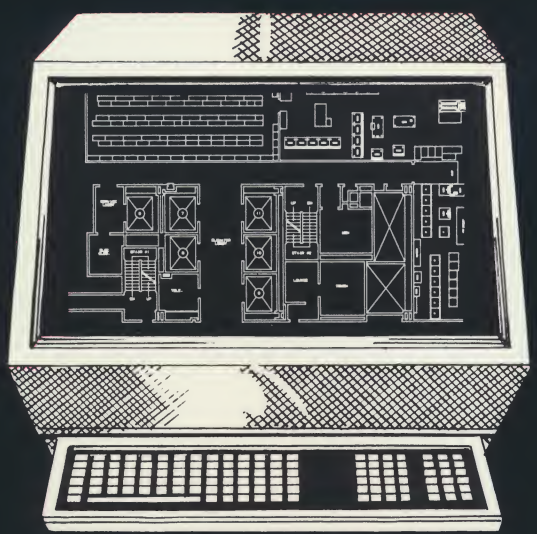
Capabilities such as the following just scratch the surface of how we can reduce design time and cost — and increase accuracy, quality and **productivity.**

- The CAD CAM computer aided graphics system will display multiple views of a drawing simultaneously, rotate the drawing so it can be viewed from various angles, calculate dimensions, and even generate mirror images. All these techniques can save you hours of effort, and assure thoroughly accurate results.
- Detail work that takes hours of manual time and computation, is done on CAD CAM equipment in seconds and minutes.
- CAD CAM computer graphics also enable a designer to zoom in on specific areas and automatically edit by adding, deleting, or modifying any geometric element.
- The movement of the component parts of a design can be simulated. CAD CAM has saved several customers valuable time and costs for retooling using such simulation techniques.

Once a finished drawing has been generated by designer and computer, our "plotter" produces multiple, inked copies within minutes.

To make computer aided productivity a reality in your design projects, CAD CAM is at the cutting edge of experience, technology and service.

Structural Design



Office buildings, industrial plants, and other complex structural projects involve heavy investments in detailed design and drafting effort. Because the supply of designers and draftsmen available to perform these services is not keeping pace with the growing demand, the advantages of using computer aided design systems from CAD CAM are especially attractive.

Considering the extensive "inside" design coverage needed for foundations, facilities, power, electrical, plumbing, and the follow-up detailed floor layout, you can readily imagine the impressive economies made possible by CAD CAM services.

The final result of CAD CAM's services in this application is a comprehensive design, fully documented with carefully prepared and stored data, that can be restored, altered, revised, or reassembled in any fashion while you work on follow-up projects.

CAD CAM's experienced technicians have developed designs for power plants, office buildings, oil conversion platforms, waste disposal systems, manufacturing plants, and many other types of structural designs. Here again, our experience with these other projects can be of great value in carrying out your next requirement quickly and efficiently.

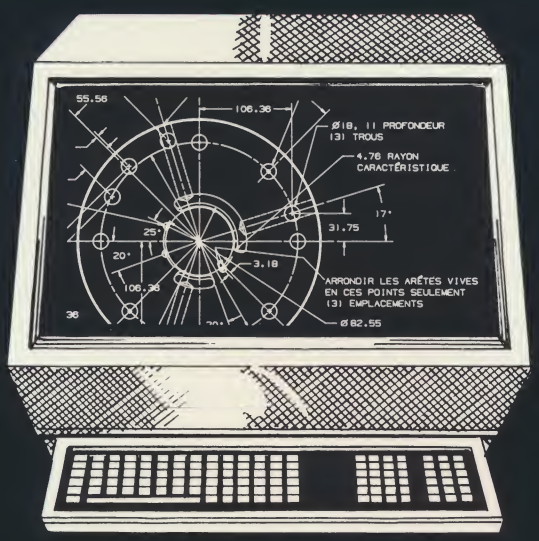
Response. Security. Quality Control. Training.

CAD CAM responds to the critical needs and demands of our customers — going far beyond simply providing a computer aided design service.

Facilities in Ohio, Florida, and Texas work 24 hours a day, seven days a week to respond to the quick turnover required by our customers.

- Tight security is maintained at CAD CAM to protect the investments of our customers. We handle many projects where industrial and government security precautions must be taken.
- To take the more precise quality of computer aided designs to an even finer degree, CAD CAM maintains a well trained and highly experienced quality control staff to proof, and reproof, drawings.
- CAD CAM provides for customers an in-depth, hands-on training program for designers and draftsmen. High level management is encouraged to attend an orientation program to gain greater insight to its company's important investment in CAD CAM services.

Special techniques offer many benefits



Printed circuit boards, wiring diagrams, mechanical designs, maps, and structural plans are all prime applications for our computer aided systems, but there are also special techniques that extend the productivity of CAD CAM services even further.

For example we have automated methods for converting your drawings to different languages, projections, and ANSI or ISO design standards — which facilitates the transfer of production to plants in other countries with maximum accuracy and minimum changeover cost and delay.

Automatic plotting and etching of high quality templets for parts inspection and torch burnouts is done fast and to an accuracy of .001 inch/foot. Compared to manual methods, our CAD CAM technique can produce your templets much sooner and at less cost.

Plant layouts and interior design drawings are produced by our CAD CAM systems in much less time with far greater flexibility. By means of carefully engineered data extract techniques, capital equipment in the layout can be valued and depreciated by departmental boundaries.

From the assembly layout of large-scale piping projects, CAD CAM technology can generate three-dimensional isometric drawings that enable the fabricator to see clearly the pipe lengths, bends, angles, and connections and actually pre-bend the required piping for quick, lower-cost installation on site. The same system also prints out a bill of material and a total requirement list.

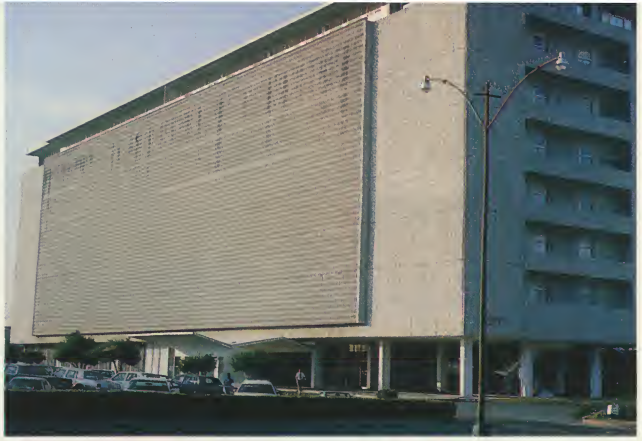
An invitation.

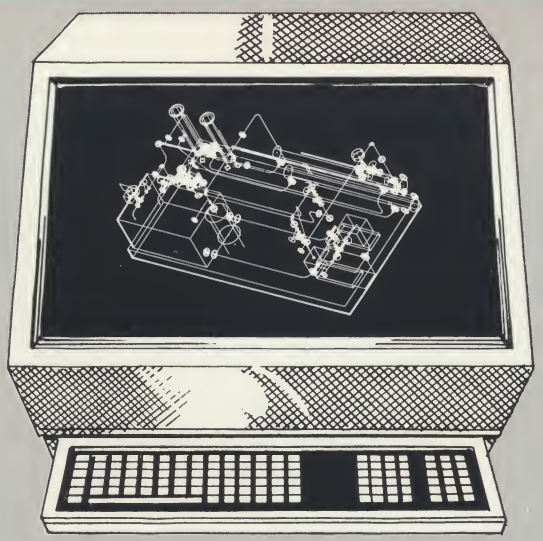
CAD CAM computer aided design services offer you an immediate opportunity to save money, make staff time more productive, keep ahead of your competition, and control your in-house facilities and overhead costs.

CAD CAM computer design techniques are available now to help you produce complex designs that cannot be done effectively by conventional, manual methods.

CAD CAM specialists are also ready now to help you evaluate your technical design needs — and to recommend the most productive and profitable applications for our services and systems.

We invite you to come to any of CAD CAM's three facilities to see first hand how we solve many of the engineering design problems of leading industries — and to learn more about **computer aided productivity.**





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